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Profile: emerging technology

How about a large screen TV with excellent picture performance that won't fill up your entire living room or flatten your bank account? Maybe that's what Philips' researchers had in mind when they started to look into Liquid Crystal on Silicon technology (LCOS) 15 years ago.

What is certain, is that the fruits of their vision fit with the times: consumers want larger screens and high definition pictures, all in a sleek design at an affordable price. Most large screen TVs tend to be on the massive side, or, like plasma, at the higher priced end of the scale.

Cooperation

This size-cost conundrum has meant that the market for so-called jumbo-screen displays – what the makers define as 30-inches and above – is predicted to be 3.1 million units in 2002. "But in 2005, worldwide sales are expected to go up to 6.7 million units. Within this market, LCOS technology is expected to demonstrate high, double-digit growth over the next few years, offering promising market opportunities for Philips," says Marc van der Weide, Philips' cross-divisional Program Manager for LCOS, who heads up a team incorporating Research, UHP Special Lighting, Semiconductors, the LCOS group, Creative Display Solutions, and Consumer Electronics.

What makes Philips' LCOS technology different from other technologies in this area? "We have developed a unique single panel LCOS application, – 'engaze' a name we've trademarked – based on Philips' patented scrolling color technology. This technology allows us to use a single panel, meaning we can avoid complicated accurate alignments that are always needed in three-panel engines. We can project the three primary colors on the panel at the same time, so we use the available light efficiently and do not have any convergence problems," explains Van der Weide. Apart from the performance benefits, there is a potential cost benefit as LCOS devices are based on conventional silicon technology. This means they can be produced on normal semiconductor lines, resulting in lower manufacturing costs. The technologies of competitors such as Texas Instruments demand that specific processes are used to manufacture their products.

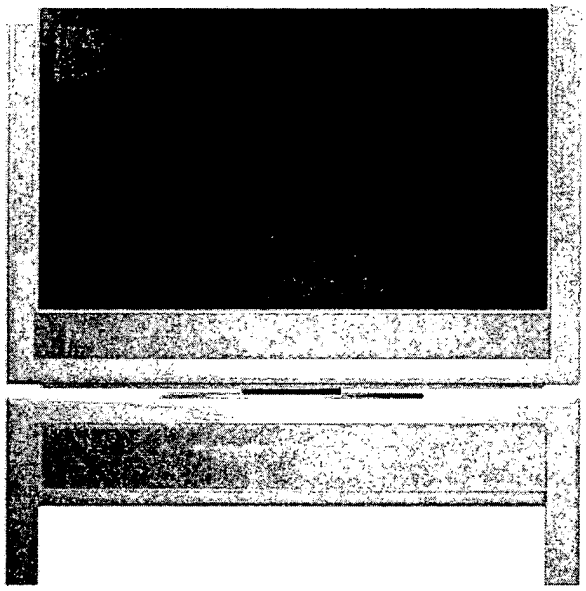
"Philips holds all the key patents for a competitive advantage. These are well protected," says Van der Weide. "We believe that the LCOS technology is an essential element of future display devices in sleek designs that offer excellent performance at lower costs. And in the market we can build on Philips' leading position in display technology and video processing." Everyone who has seen the Philips LCOS prototypes agrees that the display quality is sublime, producing natural-looking colors and crystal-clear definition. "It's like looking out of your window," enthuses Nick Isbouts. Isbouts, CEO of Philips Creative Display Solutions, admits it sounds like a sales pitch, but says he can't help it. "It just has that effect," he adds.

Another reason to be enthusiastic in Isbout's view is that Philips not only holds all the basic patents, but can produce everything in-house too, meaning that it is the only company that covers the complete value chain. Fully endorsed by the High Volume Electronics Board, the team is now working to bring 'engaze' technology to market as soon as possible. The aim is to introduce the first Philips-branded LCOS-based television in the US in the first quarter of 2003, followed by Europe during the second half of the year. Consumer Electronics will initially introduce two models, a 44-inch and a 55-inch set, in designs that emphasize their compact dimensions. Larger screen sizes and additional versions will be released in the future. At the same time, the technology is being sold to other companies that want to use it in their forthcoming technologies, the most recent example being Korean based Hyunwoo Mcplus. "LCOS is a supreme example of how Philips can work together to create a complete product; from A to Z," says Isbouts. "It's not only a good example of successful cooperation, but also one that demonstrates how a company can take advantage of its unique ability to cover the whole value chain."

BlueFi

Four Philips LCOS televisions

In a move that Philips claim will revolutionize television viewing, they unveiled their new line of Liquid Crystal On Silicon (LCOS) televisions. Philips LCOS televisions elevate picture quality to the next level, providing unsurpassed natural colors and picture sharpness in a short-depth, low-weight design. LCOS television is based on a single digital reflective LCD panel that enables these sets to display digital video all the way from source to output. Featuring four new models, two 44-inch (44PL9523 and 44PL9773) and two 55-inch (55PL9523 and 55PL9773), the new LCOS televisions display unparalleled high definition images.



"With sophisticated designs, high definition displays, very low weight and short depth, LCOS is changing the future of viewing by combining all the comforts of television viewing into one fantastic solution," said Des Power, general manager, television, Philips Consumer Electronics, North America. "LCOS is another innovative display product that we have created to provide consumers a better viewing experience. Television convenience and viewing will be forever changed with the introduction of the LCOS television."

Philips 44-inch and 55-inch LCOS displays
Philips new LCOS televisions deliver extra large size TV screens but with short depth, amazing low weight, and superb high definition picture quality. Featuring a contemporary, clean and functional design with a warm silver finish, the new LCOS televisions feature a matching swivel base, and are available with a stand, that can easily hold additional audio and video components.

Featuring a high definition resolution (1280 x 720 pixels), the new LCOS televisions also feature Philips Digital Natural Motion™ and Digital Crystal Clear™ for enhanced viewing. Digital Natural Motion is a unique and highly advanced processor calculating motion trajectories of moving picture elements, correcting jerky movement in both studio programs and movies. Digital Crystal Clear utilizes Dynamic Contrast, SVM, digital comb filter, 9-bit processing, luminance enhancements and color enhancements to create a crisp and natural picture from any type or quality of source.

Offering consumers the ultimate convenience, the LCOS sets feature HD Component and DVi inputs for high definition connectivity, as well as two-tuner double window picture-in-picture (PIP) for added convenience. Only 14.5- (44PL9523) and 18.1- (55PL9523) inches deep, both sets will be available in the summer of 2003.

Combining The Latest Innovation: Philips LCOS and Pixel Plus
Two of Philips new LCOS televisions (44PL9773 and 55PL9773) feature Philips state of the art Pixel Plus technology. Pixel Plus technology is a next-generation image-enhancer that creates High Definition-like picture characteristics from any input source such as satellite or cable. By increasing the number of pixels, consumers are able to view an HDTV-like image from any source. As the first company to offer this kind of television innovation, Philips created Pixel Plus to provide consumers an HDTV like image now, without having to wait for HDTV programming.

Featuring the same standard features as the 44PL9523 and 55PL9523, the 44PL9773 and 55PL9773 with Pixel Plus will be available in the summer of 2003.

LCOS Television Technology

Philips LCOS TV elevates picture quality to the next level providing unsurpassed natural colors and unequaled picture sharpness in a slim, low-weight design. LCOS technology uses liquid crystals to achieve high picture quality by hiding the drive circuitry behind pixels to avoid blocking light. One of the great advantages of this technology is the absence of a visible pixel grid. This is due to a reduction in the size between the pixels, allowing the full pixel surface to be visible.

Philips' LCOS scrolling color system scans all three colors across the panel simultaneously, illuminating different areas on the panel at the same time (rather than showing whole single color images sequentially). Compared to color sequential systems, this effectively triples the perceived scan frequency, greatly reducing any color breakup artifacts. Since none of the colors are blocked from the panel, the system is much more efficient and can theoretically be as bright as a three-panel system.

Philips Single Panel Technology: A New Viewing Experience

Philips' single panel LCOS technology allows consumers the option of owning a large screen quality television, previously only available in CRT sets. LCOS technology also provides thinner, lighter cabinets with larger screens than available in a CRT set. The technology generates greater resolution at lower costs than both Digital Micromirror Devices (DMDs™) and transmissive LCDs. The lower costs are generated by the high device volumes, manufacturing efficiencies and economies of scale of standard semiconductor devices.

Featuring a simple construction, this single panel holds both the active matrix and the reflective layer. It is completely digital, utilizing fully integrated row and column drivers. These digital signals are converted internally, essentially at pixel level, into analog drive voltages. The signals vary the field strength across the liquid crystal between 0 to around 20 V to adjust the amount of light reflected by the LCD. The analog drive eliminates artifacts common to the bit sequential techniques that are sometimes used to obtain intermediate gray levels in the image.

The single panel technology results in very slim equipment - a 44-inch diagonal screen fits in a cabinet only 14.5-inches deep. The resolution capability of the technology itself is virtually unlimited though. Philips has designed a LCOS panel with pixels as small as 8 microns, a resolution that conventional projection technology cannot approach. LCOS allows very rapid light switching to show a smooth, true color image, without flicker. LCOS also gives the excellent text readability needed for new services like Internet TV and other information displays.